

An Expedition to Mount Kina Balu, British North Borneo.

BY R. HANITSCH, PH.D.

(*With four plates.*)

Introductory remarks: The first part of this paper, containing the narrative of the expedition to Kina Balu, is based upon diary notes written during the journey and is practically the report which I sent in to the Committee of the Raffles Museum on April 27th of last year. The second part, containing the scientific results, could only be compiled after considerable delay; most of the zoological specimens obtained during the expedition had to be sent for identification to specialists at home and elsewhere, viz., Messrs. G. A. Boulenger, Edgar Smith, L. de Nicéville, R. Shelford, D. Sharp and L. A. Borradaile, and I take this opportunity of thanking them for their assistance. Two papers by Mr. Boulenger, the one containing the description of a new Freshwater Fish (A. M. N. H., Ser. 7, Vol. IV., pp. 228-229) and the other that of three new Reptiles and a new Batrachian (ibid. pp. 451-454), and a paper by Mr. Borradaile on Freshwater Crustacea, one of which is new (P. Z. S., 1900, part I, 2 pp.) are reprinted.

The Government of this Colony had kindly furnished me with credentials to the British North Borneo Government, and my thanks are due to the officials there, chiefly Mr. R. M. Little, Resident of Labuan, and Mr. H. S. Haynes, Magistrate, Province Keppel, who made all arrangements for carriers and who otherwise assisted me in every possible way.

Narrative.

The Mount of Kina Balu, British North Borneo, was first ascended in the year 1851 by Hugh Low (6), and since then by Spenser St. John (8) in 1858, F. W. Burbidge (4) in 1877, R. M. Little (5) in 1887, John Whitehead (10) in 1887 and 1888, and

G. D. Haviland (9) in 1892. The idea of attempting the ascent myself occurred to me in January last (*i. e.* 1899) when I made the acquaintance of Mr. H. T. Burls, M. I. M. E., F. G. S., who was passing through Singapore on his way to North Borneo in order to prospect there for oil, and who wished to ascend Kina Balu apart from his primary business object. After some discussion on the subject in Singapore, we settled the preliminary arrangements for a joint expedition by correspondence after Mr. Burls had arrived in Labuan. H. E. Governor Beaufort, British North Borneo, expressed his willingness to join the expedition.

I left Singapore by the S. S. 'Ranee' on *Saturday, March 4th, 1899* accompanied by my assistant P. M. de Fontaine and two native servants, a Chinese cook and a Malay, and reached Labuan, after an unfavourable passage, on *Thursday, March 9th*. Mr. R. M. Little kindly met me on landing and explained to me the various preparations for transport and carriers which were being made by Mr. Haynes at Gaya. Unfortunately I heard at the same time that Mr. Burls and H. E. Governor Beaufort were prevented from joining the expedition, the former through an accident to his knee, the latter in consequence of his accelerated departure for Europe. However, Mr. Burls kindly offered to take me on a short trip to Brunei the next day, and we slept the night on board his steam launch "Marudu" in order to make an early start for Brunei.

Friday, March 10th. We left about 3.30. a.m. for Brunei, arriving there at 9. a.m., explored the neighbourhood a little, visited a pawnshop where I bought a number of parangs and krisses for the Raffles Museum, and left again in the afternoon. We arrived in Labuan at 8 p.m. and slept on board the 'Marudu.'

Saturday, March 11th. Mr. Burls being unable to accompany me, I chartered the steam-launch 'Enterprise,' started from Labuan at 8.45 a.m., and had a pleasant run to Gaya, where I arrived at 7 p.m. We landed at the pier which is in process of being broken up. Since Mat Salleh destroyed the greater part of this village, including the Government offices, in 1897, the latter have been shifted to Gantian, on the mainland of Borneo, and the woodwork of this pier is now required for Gantian. In the darkness we climbed along the remains of the pier (at least $\frac{1}{4}$ mile long), and, when near the other end, were rescued by a

native boat. Soon after, we met Mr. Haynes. As Mr. Little in his letter of instructions to Mr. Haynes had recommended that we should take the Tuaran route to Kina Balu, he very kindly promised to accompany me the next day as far as Panjut, a village on the mainland where our luggage carriers were awaiting us. I slept on board the 'Enterprise.'

Sunday, March 12th. We left the 'Enterprise' at sunrise and noticed crowds of the long-spined Sea-Urchin *Diadema setosum* in the shallow water below the pier, mostly sticking on to pieces of rotten timber lying at the bottom. From a fisherman we obtained a large number of the huge worm *Sipunculus robustus* which he was digging from the sandy shore for bait. At 8.30 a.m. we left Gaya in two rowing boats manned by Bajous, and had a most pleasant journey. When nearing Gantian, we passed through shallow water with beautiful corals and numbers of the striking red and black starfish *Oreaster nodosus*. At Gantian, usually known as Kabaggu by the natives, we met Mr. C. H. Keasberry, Sub-Treasurer and Postmaster. Then proceeding, we entered the Menkabong river at 1 p.m., passed the village of Mumpelum at 2 p.m., and soon after reached Berunggis where we landed. Here, without waiting for the second boat in De Fontaine's charge, which had dropped somewhat behind, Mr. Haynes and myself, with a few of the men, walked on to Panjut, about $2\frac{1}{2}$ miles distant, passing through swampy fields with exceedingly poor padi—I hear by the way that this year's padi crop has been a failure throughout North Borneo—and reached Panjut at 3.15 p.m. We settled down in a spacious Dusun house, with a splendid verandah, ornamented with about twenty head-trophies, and caused the drums to be beaten, which signal was to call the men to fetch our luggage from Berunggis. After about $1\frac{1}{2}$ hours' waiting, six Dusuns appeared with sledges drawn by water-buffaloes and started off towards our boats. At 6 p. m., as there were no signs of the luggage, I went back to Berunggis to hurry the men on and found that the second and larger boat had been obliged to stop lower down the river, as the tide had gone out, and that only a part of the luggage could be removed that evening. We returned towards Panjut, and feeling somewhat fatigued I mounted a water-buffalo, but as it floundered into a hole, I was promptly thrown off.

The harness was broken and the luggage upset, but otherwise no harm was done, and I mounted another buffalo, this time behind a Dusun driver; our progress was now safe, but the odour arising from my driver necessitated my holding my nose at a laterally elevated angle of 45° .

Monday, March 13th. We signalled for more men to fetch the rest of our luggage, but, after long waiting, only two men appeared. We followed them towards Berunggis and found a large fair in progress where the Dusuns from the interior were selling and exchanging their jungle produce with the Bajous, from the coast for fish, etc. Here Mr. Haynes introduced me to Malagup, a Dusun chief, who was to accompany me to Kina Balu, in charge of the coolies. Not catching the man's name I asked him directly for it, but was told by Mr. Haynes that the natives, and especially the chiefs, feel offended at being asked for their names directly; one is supposed to know them and in any case must find them out from a third person. Most of the Dusuns had come to the fair on their buffaloes, so that we now found no difficulty in getting sufficient conveyances for our luggage. Mr. Haynes here left me to return to Gantian, and I went back to Panjut, arriving there about 11 a.m. The coolies in the meantime had begun to gather, but appeared most indolent; they tried package after package, but finding them all too heavy, dropped them again in disgust. The situation seemed hopeless; even Malagup had vanished, and in the burning mid-day sun I had to go to his house, two or three miles distant, to look for him. I rode back on a buffalo to Panjut, but now our patience with the carriers was exhausted. The men had apparently only been awaiting for some forcible language, and at last took up the luggage. We made a start at 2.30 p.m., and after about 10 minutes' walk from Panjut we reached the broad and rapid Tuaran river. Only a single small boat, a dug-out, was available, and it took more than an hour to ferry us all across. Here we met a jovial old Chinaman who invited us to spend the first night in his house, in the village of Bandeian, not quite 2 miles higher up on the right bank of the Tuaran. This we accepted. The first day's march was thus only short, but I was glad to have made a start, and to have got the coolies away from their homes. They camped on a nice grassy ground be-

tween the house and the river, whilst I, with my men from Singapore, slept inside.

Tuesday, March 14th. We left the Chinaman's house at about 7 a.m., walking through an open cultivated plain, passing many buffaloes grazing there who were apparently on the best of terms with flocks of snow-white herons who stalked about between them, or stood on their broad backs. We reached Menkaladai at 8 a. m., and soon after arrived at the foot of a long chain of hills. The ascent was steep and slippery, sometimes passing through old jungle, more often through high bamboo, lalang and fern. We rested on the top of the hill, and refreshed ourselves with delicious water from the branches of a creeper, called Pokok Gunatol by the natives, which the men cut off with their parangs, for every man was thus armed, some also carrying spears in addition. We marched on, and reached Kappa at 1.30 p.m. This is a miserable village of four or five houses in the midst of the jungle, with no attempt at a clearing, but plenty of filth and pigs about. We settled down in a house adorned with ancient skulls of deer and wild boar.

Wednesday, March 15th. We left Kappa at 8 a.m., and walked along mountain ridges through bamboo, fern, and deep grass, or occasional forest. Drizzling rain set in soon and lasted for some hours. In the afternoon we passed through several clearings indicating the vicinity of a village, and reached Kalawat at 4 p.m., though some of the men only turned up at 6 p.m. This was a small but picturesque village, looking like an oasis in the wilderness around: an open grassy space with granite boulders lying about, and clumps of coco-nut palms shading the houses. The houses, however, were few, about five, and small, and their unpromising interiors together with the fineness of the night induced us to pitch our tent and camp outside. Many of the men did likewise. Malagup showed himself useful by buying for us a fowl and a joint of bamboo full of honey for seven cents.

Thursday, March 16th. About 2 a.m. I was awakened by a heavy thunderstorm. I felt safe and comfortable in my tent (lent by the P. W. D., Singapore), till suddenly a little rain came trickling through my blanket, and I roused myself to find that it was pouring into the tent which was supposed to be waterproof.

To leave the tent and take refuge in the houses seemed impossible; it was pitch dark and the weather outside too awful. So I remained soaking till 6 a.m. when I fled to the next house. This experience cost us dear, since many of our things got wet through and remained so for several days. We left Kalawat in disgust at 9.50 a.m., fine rain falling at the time, but fortunately the sun came out soon after. Our path now descended, and we had an easy march to the Inuman River, arriving there about noon. This is a splendid river, rushing along over boulders and shaded by mighty trees. Here we bathed and the men caught me some remarkable tadpoles with huge suckers (*Rana cavitympanum*). They always found these tadpoles attached to the boulders in the most foaming parts of the river. We crossed by a ford to the left bank, and then over a low watershed and reached the Menternan River. This river we had to ford three times in close succession: the natives apparently making a speciality of short cuts: in this case it seemed to me it would have been much easier to ford the river once and then proceed along the bank, but my guides had different ideas. At 2.45 p.m. we reached Bungol, a large village on the left bank of the Menternan. Here the men begged me for a treat to buy them a bull. As this somewhat startling proposal only involved an expenditure of \$3, and it was a splendid young beast, I agreed, and much admired the speed with which the animal was despatched and disappeared in the various cooking pots. I myself had an excellent steak before me about an hour after the bargain had been concluded. Heavy rain fell during the late evening.

Friday, March 17th. The day opened somewhat foggy, but fine, and we started at 7.45 a.m., fording the Menternan three times, and ascending Gunong Kampil by a slow incline. Then followed a tremendously steep descent, about 2000' down a grass-covered slope, to the Kadamaian river, which is the local name for the upper course of the Tampassuk. The river here is already deep and difficult to ford on account of its strong current. The men were up to their necks in water, and had to carry the luggage on their heads. Fortunately everything remained dry, with the exception of my camera. We rested on the right bank of the river, and reached Koung at 2.15 p.m., having had fine weather during the march, though rain set in

soon after. I heard that the rice coolies were awaiting us in this village. They had left Panjut on March 5th with instructions to proceed to Kiou, but, being afraid of the people of Kiou, they had stopped here.

Saturday, March 18th. We left Koung at 7.40 a.m. and proceeded along the right bank of the Tampassuk, climbing over many cliffs and boulders along the edge of the river. Then we forded the deep and rapid river Lobang near its junction with the Tampassuk, passed through some swampy undulating ground covered with grass, fern and bushwood, forded the small and winding Kiulan river several times, ascended a high and steep hill, and reached Kiou at 12.30 p.m. Kiou is a village of considerable size, the largest we had met so far during our march, scattered over an extensive grassy clearing on an enormous slope, with many clusters of coco-nut palms in the vicinity of the houses. I heard that I was the first European who had visited Kiou for four or five years, but it is apparently more than that, as two men showed me certificates from Dr. G. D. Haviland, dated April 24th, 1892, which stated that the bearers had acted as his guides during his ascent of Kina Balu in March 1892. Dr. Haviland, called 'Tuan Bunga' by the natives, seems to have been the last European here, and before him Mr. John Whitehead in 1887, who is remembered as 'Tuan Burong.' Malagup, the Dusun Chief, here came to me soon after our arrival, saying:

M. 'Tabek, Tuan, itu orang coolie mau satu ayam.'

R. H. "Apa? Itu orang coolie samoa samoa mau satu ayam?"

M. 'Tabek, Tuan, satu ayam besar.'

R. H. "Satu ayam besar? Apa macham ayam besar?"

M. 'Tabek, Tuan, satu kerbau.'

The men had apparently enjoyed the bullock I had given them two days before, but I am afraid my answer to Malagup did not encourage similar requests. Still the men seemed to be bent on pleasure, for they asked me for a holiday the next day, which happened to be a Sunday. To this I agreed. In the morning the weather had been dry, except for a few minutes of drizzling rain. But we had rain all afternoon till late into the night. Aneroid at 3.45 p.m. 2400'; thermometer 76° F.

Sunday, March 19th. I ascended with De Fontaine to the top of Kiou hill which is covered with deep jungle and is about 1000' above the village. From a clearing we had a wonderful view of Kina Balu; nothing intervened between here and the foot of the mountain which seemed scarcely more than three miles off, and the top of the mountain, bare and rocky, stood out chiselled clear and sharp against the sky. Our success in collecting was small, but the men brought in a good deal, especially stag-horn beetles and several species of coconut beetles. *Megalophrys nasuta*, the strange frog with the large projecting triangular eye-lids and triangular flap to its nose, seemed to be common here, as we found it the day before in Koung. I interviewed the guides; the one informed me he could only start with us in two days, as he had to get a fowl and seven eggs for sacrifice to the spirits of the mountain. Arguing with him led to no results. The other guide, however, declared that he would be ready on the next morning.

Monday, March 20th. We rose early to make a start for Kina Balu, but the coolies, who had scattered over the whole village, were slow in assembling. I interviewed Malagup at 8 a.m. and tried to expedite matters, but at 10 a.m., as sufficient men had not appeared, I decided to leave some of my luggage behind and start. But we had still to wait for the guide who finally turned up after urgent messages. He now refused to go without his colleague, the fowl and the seven eggs. So at 10.45 a.m., with blessings on the guides, the fowl and the seven eggs, I decided to abandon the start. Things seemed utterly hopeless.—Morning sunny, afternoon dreadfully rainy and dreary.

Tuesday, March 21st. Dull morning, rain until daybreak. The men really turned up soon after 6.30 a.m., but a start was not made until 7.30 a.m. After a steep descent we reached an isolated group of houses, which the natives still called Kiou, at 8 a.m., aneroid 1800', then continued the descent to the Kada-maian River which we reached at 8.25 a.m., aneroid 1500', crossed twice by bamboo bridges and twice by fords, passed a little village in the midst of an extensive plantation of Keladi and a little maize, had to cross by a formidable ford just below the place where the river forms a small island, and from there

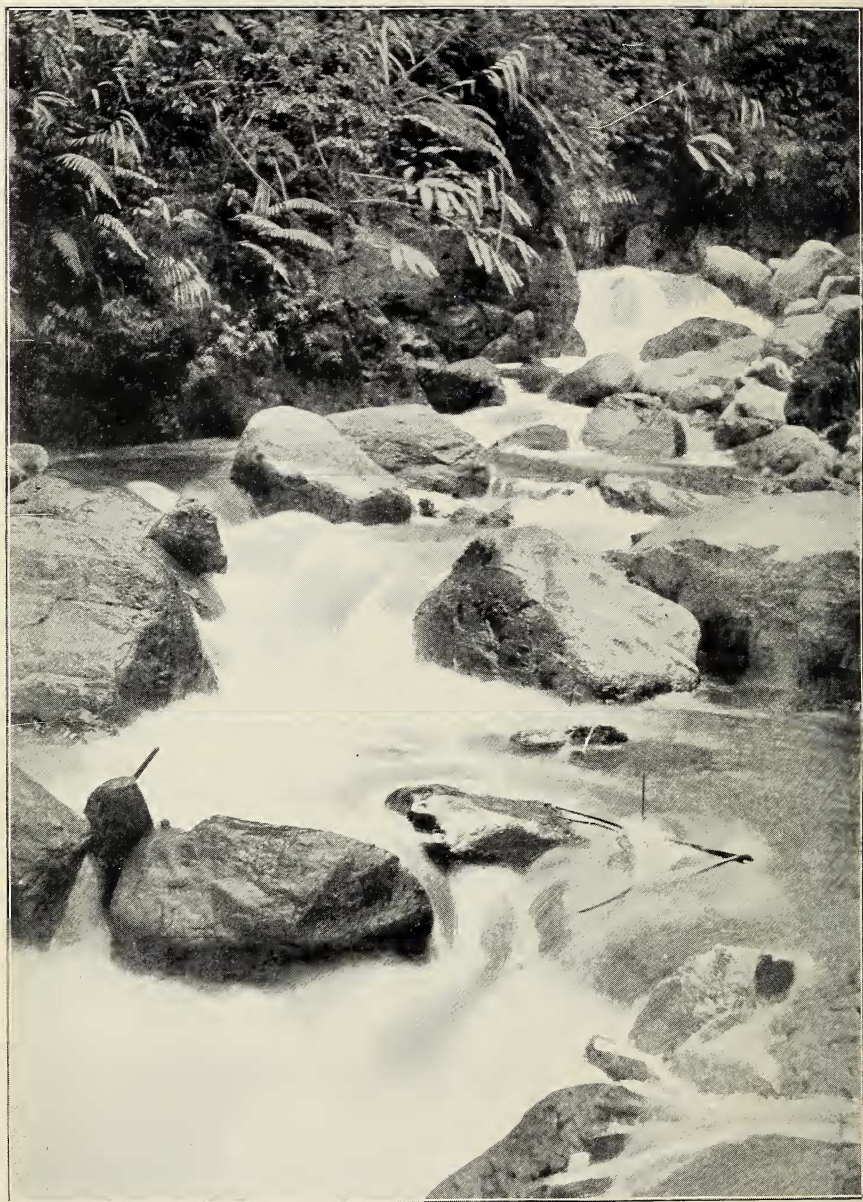
our way lay almost exclusively inside the bed of the river which consisted of a never-ending series of foaming cataracts rushing over boulders of granite, and we had to force our way through the one and climb over the other. The men seemed disheartened, and the guides recommended waiting a day for the water to go down. This seemed an empty excuse at the time, but a little experience showed us later on how very variable the height of the water is in these mountainous regions. We still plodded on, and after many difficulties and some mishaps—one of which was the breaking of the ground glass of my camera—we reached at 1 p.m., a spot on the bank of the river sheltered by a huge slanting rock. Here we camped. Aneroid 2150'.

Wednesday, March 22nd. I slept little during the night, being kept awake by the comparative cold (about 65° F.) and the roaring of the river. Aneroid, 6.30 a.m.: 2050'. We started at 8.25 a.m., proceeding again chiefly in the bed of the Kadamaian. The cataracts and boulders were, if anything, worse than the day before. My sturdy Chinese cookie got washed away by the torrent, but was rescued by the men. After some hours we finally left the river, and began a steep ascent, first along a little brook which came dancing down over precipices, then along an ordinary steep jungle path. Mosquitoes, which during the whole journey, even in the native houses, had been scarcely noticeable, began, from about 3500', to be very troublesome whenever one was still. At 2.45 p.m., we reached a huge ledge of rock similar to the one under which we had camped the previous day. Here we stopped. When changing, as I always did on reaching camp, I found a leach on my leg, the only one during the whole expedition, although I took no special precautions against them. Aneroid 4140'. Sunny morning, foggy late in the afternoon, and a little rain.

Thursday, March 23rd. Another cold night, during which, as in fact during the whole expedition, I enjoyed little sleep, feeling the cold chiefly in my joints, notwithstanding plenty of warm clothing and blankets. The morning opened dismal, with drizzling rain. The guides informed me that it would now take two more days to reach the cave (about 9500'), and as at that rate probably two additional days would be required to reach the summit (13,698'), and probably as much time again to descend

to where we were, say eight days in all, without any time for collecting, and as of the first half of the time allowed for the expedition only two days were left, I decided to proceed no further, but to begin to collect on the spot. I was also influenced by the guides' statement that the next climb would be stiffer than before and would have to be done without shoes, and that most of the men and the bulk of the luggage would have to be left behind. That these statements were no exaggerations, I knew from the accounts of former travellers. It was a severe disappointment to give up the idea of reaching the top, but I saw that a hurried climb with all sorts of discomfort would bring little practical result, and that the aim of the expedition would be served better by collecting now on the lower ranges of the mountain. I therefore made the men go out collecting, and as I promised them little rewards, I was kept busy all morning receiving and bottling specimens. Dismal rainy afternoon, during which I amused myself (and still more the natives) by compiling a little Dusun vocabulary, chiefly with Malagup's help. Temperature at 5 p.m. 66°. Glorious sunset. Fine moon during the night which, however, did not favour sleep, and though the slanting rock protected us against rain, it was of no use against the moonlight.

Friday, March 24th. The temperature between 5 p.m. on the previous evening and 7 a.m. varied between 60° and 64° F. Aneroid 4210'. I went out collecting with my men in the vicinity of the camp. The ground was exceedingly steep, and there was a great deal of loose rock about: I had constantly to warn the men to collect at the same level, not below and above each other; the rocks were continually crashing down into the valley like miniature avalanches. Mosquitoes were again very troublesome in parts of this jungle. The men brought in small Mammals (shrews, squirrels, rats), trapped during the night, and also a good many Reptiles, Amphibians and Insects. A welcome surprise: the guides, who were now convinced that I should not attempt to ascend to the summit, presented me with the fowl which had been intended for the spirits of the mountain. Apparently we did not require any spiritual protection in these lower ranges. The natives evidently did not mean to swindle the gods, as the fowl was most excellent and tender. Maximum



R. Hanitsch, Phot.

Kadamaian River, Kina Balu, British North Borneo, 2000'

(LOOKING UP.)

temperature during the day: 67° , down to 65° at 5.45 p.m.; fine, but foggy, in the morning; the usual rain in the afternoon.

Saturday, March 25th. Temperature during the night 60.5° - 63° . Nice clear morning. Many frogs were brought in by the natives. We packed, and began our descent and our way home at 9.45 a.m., as now the first half of my leave had expired (*i. e.* three of the six weeks.) We reached the Kadamaian at 11.45 a.m., and our old camp, under the ledge of rock, at 1.25 p.m., where I decided to stay a day to collect. The descent to the river was steep and difficult, but this time the river itself offered no dangers and difficulties comparable with those of a few days before, as the water had gone down. Weather fine until 3 p.m., when the usual rain set in.

Sunday (Palm Sunday), March 26th. Although the temperature at night time here was only very little higher than in the upper camp (63° - 65° , as against 60° - 64°), we found the change very noticeable and most agreeable. I mended my camera by substituting a piece of oiled paper for the ground glass broken some days before, and took a few views of camp and river. Then we went collecting, the men bringing in a good deal.

Monday, March 27th. Lowest temperature during the night 64° ; at 6.30 a.m. 65° . I took some more photographs, and we started for Kiou at 9.30 a.m., the progress through the river being very easy. We reached the open field at 9.50 a.m., and Kiou at 12.30 p.m. [Two of the photographs are here reproduced, both taken from the same point, but one looking up, the other down, the Kadamaian River. Within the bed of this river our route lay for a considerable distance up and down Kina Balu. But on the day when these photographs were taken, the water was considerably lower than on March 21st and 22nd when we went up the mountain.]

Tuesday, March 28th. Early in the morning I went with De Fontaine to the top of Kiou hill to take some photos of Kina Balu, but found it hazy and the sun standing just above the mountain. We waited for matters to improve, and climbed about in search of a favourable spot, finding the heat of the morning scarcely bearable. Finally we took a few views, and returned to Kiou, hot and tired. Then after calling the coolies together, we left the village at 10.30 a.m., went down a steep descent,

proceeded along our former path, and got a view of the picturesque village of Lobang, perched on a hill in front of us, and, like most of the villages here, fringed round with coco-nut palms. We passed below the village, and reached the river Lobang at 11.45 a.m. We had to ford it as before, and most of the men as usual took the opportunity of having a proper bath, but, for the first time during the expedition, I felt myself disinclined for the exertion. Rain set in soon after, and we reached Koung at 1.55 p.m. I developed a strange dry cough in the evening, which, however, disappeared during the night.

Wednesday, March 29th. I had the usual trouble with the coolies before they took up their luggage. Some were scattered over the village, and with Malagup I had to go to a house on the hill to fetch the last stragglers. Whilst the men were still packing, I left Koung by myself at 8.45 a.m., wishing to proceed slowly and intending to await the others at the ford of the Tampassuk which I thought I remembered. But after half an hour's walk, I found that I had lost my way, and endeavoured to return, passing through jungle and wet grass, breast high. At last I heard the shouts of the men, and reached the ford just as the last of them were crossing. I felt pretty well exhausted, but undressed and went through the rapid river, requiring all my energy to keep my balance. When dressing again I had great difficulty in putting on my clothes which were damp with perspiration and with wading through brooks and tall grass during the last hour. I called out for help and then almost immediately collapsed in a faint, though retaining consciousness. I felt as if I had arrived at a very literal 'dead stop,' lying groaning between the boulders on the bank of the river and suffering much from cramp in my limbs. When able to speak again, I got the men to make me a bed of leaves and light a fire, and then to prepare for me a strong soup. After taking this I felt better, and when half-an-hour or so had passed, was able to get up again. A message was sent to the men in front of us to stop. De Fontaine as usual proved most helpful and equal to emergencies, as he had been throughout the whole expedition. All this happened on the left bank of the Tampassuk which, consisting chiefly of sand and boulders, was only a few yards broad and rose at once into the extremely steep Gunong

Kampil, about 2000' high. Being covered with grass only, this hill was exposed to the full glare of the sun. However, I decided to push on to our next stopping place. Bungol, rather than return to Koung, but progress was exceedingly slow, as after every twenty yards or so of climbing I had to rest. After an hour's time I took a tin of Brand's Essence of Beef, and in another hour a cocktail, and, with the help of a man in front of me, who pulled me up with his stick, I progressed better. The men were most patient and stopped every time with me. At about 2 o'clock the sky darkened, affording at least some protection against the burning sun, and finally the usual thunderstorm broke forth, but with abnormal violence. Still climbing and quite drenched, we reached a little broken-down shed where some of the men, with most of my private luggage and the tent, were awaiting me. Most of the party, however, including Malagup, had gone on to Bungol. Here I partook of more refreshment, and feeling very much better by this and probably also by the cooling rain, I, after a little rest, astonished and amused my men by shouting out 'lakas, lakas' when they were taking up their things at 4.15 p.m. The ascent continued, so did the pouring rain, and finally, near the top of the mountain, we entered thick jungle. Lightning and thunderclaps were now frequent, and were greeted with yells by the men. Now began a slow descent along a clayey and deeply worn jungle path which in many places was transformed into a yellow stream. About 6 p.m. the rain ceased, and we approached the River Menternan with many misgivings. I knew it had to be forded before reaching Bungol, and when we arrived on the bank at 6.15 p.m., I was not surprised to find it a roaring yellow torrent, impossible to cross. But we had some hope, as from the marks along the bank we saw that it was going down rapidly after the heavy thunderstorm. So we decided to wait a little, I trying to keep myself warm by walking about. It got dark now and I lit the stump of a candle which I found in my portmanteau, and the men made long, but fruitless efforts to light a fire. Two or three of our most plucky men were daring enough to cross the river in order to go to Bungol for help and a lamp, but they did not return. Waiting and shivering with cold, we stood about till 8. p.m., when I decided to stay where I was and fix up my tent. I put

on dry clothes, wrapped myself in blankets and felt warm and comfortable, although getting only little sleep. But as the river by this time had gone down considerably, De Fontaine and some of the men managed to cross and reached Bungol in safety. Only a few Dusuns stayed with me, making as usual next to no effort to prepare a sleeping place for themselves, but remaining squatted on the wet ground, some perhaps with a few sticks between it and themselves, but in no case with protection above. My camp-bed broke down partly during the night.

Thursday, March 30th. I got up at 6 a.m. and found that there had actually been no rain during the night. Some of the men had already returned from Bungol to help us across the Menternan, so we left at 6.30 a.m., and as I still wore my dry and warm flannels from the previous evening, I had myself carried across the river, which we had to ford three times, and reached Bungol at 7.45 a.m. I felt the need of a day's rest, and decided to remain here, but gave directions to Malagup to proceed with the coolies carrying the luggage which was not immediately required, to Panjut, our starting place on the coast. I gave him instructions to reach there on the Saturday following, and to discharge the coolies on arrival, giving him also a letter for the district officer there to the same effect. I spent the day resting and taking notes. Dull day, drizzling rain from about 1 p.m., heavy rain from 3 p.m.

Friday (Good Friday), March 31st. I had a comfortable night, although only little sleep. We left Bungol at 8.3 a.m., forded the Menternan and Inuman Rivers, climbed the Gunong Kalawat, and reached Kalawat at 1.55 p.m., in fog and rain. It was a heavy day's work, ascending nearly all the time, added to which was the recollection of our march over the same ground two weeks ago, when we had found the down-hill way so easy. This time we did not attempt to camp out in this village, and I managed to get a tiny, but comfortable room all to myself.

Saturday, April 1st. We left Kalawat at 7.30 a.m., caught sight of the sea for the first time again at 9.40, and were overjoyed, like Xenophon and his companions. When approaching Kappa, about 2 p.m., one of the men who had been in advance came running back to say that a 'Tuan' had arrived in the village and wished to see me. It was Mr. Burls on his way to.

wards Kina Balu. He told me that he had left Labuan on March 16th, and, on account of trouble with the carriers, had been detained on his way. The old Chinaman whose hospitality we had enjoyed some weeks ago in Bandaian, had turned up in Kappa before my arrival, and had informed Mr. Burls that gold was to be found one hour's walk from here. So Mr. Burls sent for the Dusun who was supposed to know the spot, and, on my advice, asked the man to fetch him a piece of the precious metal. The man promised to do so next morning at daybreak.

Sunday (Easter), April 2nd. At 7.30 a.m. Mr. Burls heard that the Dusun had not started as yet for the gold, but would do so after his breakfast. This was at last over, but then the Chinaman came to say that the locality was unsafe on account of an enormous snake. The Chinaman's arms were just long enough to give us an idea of this snake's diameter. We tried to allay those fears, but were then told that the gold was down a deep hole, that candles were required, and that at least three men would have to go. To my regret I had to leave Kappa in the midst of this interesting discussion, starting at 8.40 a.m. It was a nice morning, after pouring with rain all night until 6 a.m. We began the descent at 10.15 a.m., reached the plain at 10.50, the village of Menkaladai at 11.30, rested a little, and reached the Tuaran River at 2.20 p.m., one of the men taking us through a most swampy 'short cut,' between padi fields. Here we had to wait a little while for a boat, and I reached Panjut somewhat in advance of the others at 3 p.m., with feelings of profound relief. Being transplanted comparatively suddenly from the hilly interior to Panjut, in the plain and near the sea, the people here struck one at once as more comfortable and better off: they had more buffaloes, many goats, and sledges, which indeed would have been impossible inland, and better clothing, and were also oftener intoxicated, a sure sign of civilization. But there were also more flies and ants in the houses, and more mosquitoes at night time, which, however, were not very troublesome. We heard that on the day before there had been a large funeral here, on which occasion five buffaloes were killed.

Monday, April 3rd. As I was absolutely in the dark as to when and where, whether in Gaya or in Labuan, we should be

able to catch a steamer to take us to Singapore, I sent De Fontaine to Gantian to make enquiries. I spent the day taking notes, the coolies and crowds of villagers as usual standing and squatting round me, and watching every movement, nearly distracting me by their continuous coughing. But I found some music going on in a neighbouring house very soothing.

Tuesday, April 4th. De Fontaine came back at 7 a.m., after having travelled part of the night, bringing the dismal news that a coasting steamer had left Gaya for Labuan at midnight. This really made no difference in the end, however, as we heard later on that this boat had no connection in Labuan with boats for Singapore. He had brought with him a large rowing boat, and so I decided to leave at once for Gantian. We started from Panjut at 8.30 a.m., reached Berunggis at 9.15, left there by boat at 9.30, and reached the district office of Menkabong, at the mouth of the Menkabong river, at 12.30. Here we had a rudimentary tiffin, left again at 2 p.m., and, rowing and sailing, reached Gantian at 4.53. p.m. It was a very trying journey: the day was hot and cloudless, and we sat in an open boat cramped between piles of luggage. To my regret, I found Mr. Haynes, who in the meantime had shifted from Gaya to Gantian, down with liver, but Mr. Keasberry kindly took charge of us and put us up in an unfinished wooden house intended for the native clerk. The carpenters with their boards and wood shavings lying about were cleared out in a few minutes, and we established ourselves there in a rough and ready fashion.

Wednesday, April 5th. No work done, all feeling the need of a day's rest. I saw some newspapers, for the first time for about a month.

Thursday, April 6th. I hired a native boat and went out at 6.30 a.m. to the reefs where I did some collecting, chiefly corals, a native diving for them, and spent the greater part of the day in cleaning and bleaching the corals. A coasting steamer brought the welcome news from Mr. Little, Labuan, that two gentlemen, Messrs Lower and Pavitt, would arrive in Gaya on Sunday next with the steam-launch 'Sri Putri,' and could take me down to Labuan just in time to catch the 'Hecuba' for Singapore. De Fontaine was ill this day.

Friday, April 7th. I collected more corals, and De Fontaine went out shooting birds and squirrels. There were strange rumours about: trouble was expected with the natives in the neighbourhood, and rough defences, consisting of breast-high boarding with sand between and plenty of barbed wire outside, were erected around the offices. We noticed several little colonies of natives settling down on the shore of the bay just to the north of Gantian, having left their homes out of fear.

Saturday, April 8th. We spent the day in packing and preparing for our return to Singapore.

Sunday, April 9th. Messrs Tower and Pavitt arrived here at 8.45 a.m., and informed me of the arrival of their steam-launch in Gaya. I reached Gaya at 12.15 p.m., and we all left for Labuan at 4.40 p.m.

Monday, April 10th. We anchored during the night off Pulo Tiga, reached Labuan at 10.53 a.m. and put our luggage on board the 'Hecuba'. I went to see Mr. Little, made two or three calls and returned to the 'Hecuba' which was to sail at 4 p.m. On my way down to the boat I found the place in great excitement as Governor Beaufort was leaving by her for Singapore, bound for Europe. The natives expressed their farewell good wishes by firing off crackers, and by music and processions. Also a large party of Europeans came on board to see H. E. off. The boat left at 5.15. p.m.

Tuesday, April 11th—Thursday, April 13th. At sea. Pleasant passage.

Friday, April 14th. We anchored off Singapore soon after midnight, and landed at Johnston's Pier at 7.15 a.m.

General Remarks.

Barter and Coinage. When preparing for my expedition I was in doubt as to whether I should take with me a supply of barter, as Spenser St. John, Whitehead, and others had done, but was afterwards glad that I had abandoned the idea. The things I would have taken would certainly have been almost useless. What we were asked for in every village to and from Kina Balu was kerosine oil, and the natives always annoyed us by bringing large vessels in the hope of sharing our little supply. Next in demand were soap and matches. Only once in Kiou were we

asked for cloth and red beads. Thus, with the exception of the last, it is the necessities of life which would seem to be required, not trifles, though the red beads, as universally worn by the women, may almost also be regarded as necessities. Instead of barter I had supplied myself with plenty of small silver, but was highly astonished to find these coins were almost unknown; even Malagup, the Dusun chief, living in a comparatively rich district on the coast close to where a large fair is held once or twice a week, did not know the value of a 5-cent piece. These coins were always accepted with distrust, except by a young man in Bungol who had a collection of them. But he had lived in Kudat for some time and spoke Malay fluently. On the other hand, notes (B. N. Borneo has notes down to the value of \$1, 50 cents, and 25 cents), silver dollars, and copper cents were always acceptable, copper being apparently the chief currency, though the natives were glad when they could exchange their copper savings for silver dollars with us. In great demand also were the empty provisions tins, especially those with lids, and it was amusing to see the scramble when one threw an empty condensed milk tin away.

On the March. We generally started at 8 a.m. and reached the next stopping place about 2 p.m., the villages being at convenient distances from each other. The weather as a rule was fine in the morning, but rain set in nearly always in the early afternoon, so that we seldom reached camp without getting wet. However, this made little difference, as we were often soaking wet from fording the rivers. Naturally we always changed on reaching camp and made an attempt to dry our things, but they were generally still wet on the next morning, and when setting out on our march we always put on the wet things from the day before, feeling only little discomfort. There is a narrow path from Panjut right up to Kiou, just wide enough for one man, but broadening out in the neighbourhood of the villages, and of course branching off here and there. It runs for a considerable distance along the top of the mountain ridges, rather provokingly following every one of their curves, but having the advantage of a free outlook for ascertaining one's whereabouts. Paths along the rivers on this route were exceedingly rare, thus differing essentially from the Tampassuk

route to Kina Balu. After Kiou the path continued in the usual way, became somewhat indistinct after we had left the Kada-maian River, but was more noticeable here and there from old camping places and traps for birds and smaller game set at intervals.

Life amongst the Natives. We found the Dusuns very good-natured and harmless people, and quite honest until the last day in Panjut when our kerosine oil disappeared for a few hours and some other trifling things for ever. They were certainly somewhat lazy in the morning, and there was generally a great deal of grumbling before they took up their loads, but when once started, they left little to be desired, and showed themselves splendid carriers especially on hilly ground. Very annoying was their intense curiosity: when we arrived at a village, not only our carriers and the people of the house with their immediate friends, but all the village came and stood there, several rows deep, around us. We could not change our socks or any other part of our dress without themselves and their women and children taking stock of every movement and every article. It was the same when the cook prepared my meals or when I partook of the same, when I wrote my notes or bottled specimens, when I undressed at night-time and disappeared behind the mosquito-curtain, everything formed food for their admiration and amazement. Sometimes when I sat perfectly still without doing anything, their attention relaxed, but my slightest movement had the effect of the curtain rising at the Pantomine, the eyes and open mouths of all present were directed to one point. No box or portmanteau could be opened without every one rushing to see what it contained. When I awoke in the morning I was sure to find people squatting round my camp-bed who had apparently been anxiously waiting for signs of my awaking. The worst was that it was impossible to escape from it: as, once arrived at a village at about 2 o'clock in the afternoon, we changed, and as we nearly always had rain from that hour and the neighbourhood of the houses was a mass of filth, accumulated ever since the houses had been built, we did not care to go out and get wet and dirty again. The inside of the houses was at least dry and fairly clean, the floor, raised about five feet above the ground, being formed of split bamboo, in

many cases covered by rattan matting, and in a few cases the owners of the houses brought me a special mat to sit upon. The space below the houses was generally inhabited by pigs, but though they grunted day and night, it did not interfere with our peace. Much more annoying was the continuous coughing of the people, many of them seeming to suffer from chronic colds. Taken altogether, the stay in the Dusun houses was far from pleasant, and on dull days exceedingly dreary, but, after our experience at Kalawat, it was preferable to camping in the open.

Food. As I mentioned before, the last padi crop was a failure in N. Borneo, but even in prosperous years it would probably be impossible to get sufficient rice from the different villages for a large body of carriers, and on this occasion people did not even like to sell a few cents' worth. In the district we visited communication is a matter of intense difficulty, everything has to be carried by man, the hilly parts are quite impassable for bullocks, and the rivers are torrents along which even the smallest crafts could not find a passage except for a few hundred yards at a time. However, in almost every village I was able to get fowls and eggs for my own consumption, the former ranging in price between 10 and 20 cents, sometimes even less, and eggs from 1 to 2 cents. But large parties would probably have been unable to get sufficient. Milk was unknown. Coco-nuts we got in every village free of charge, and they were always welcome. There was practically no house without a group of coco-nut and betel-nut palms close by. Two or three times we got Langsats, which seemed to grow half wild, especially near Koung. They were very refreshing, but unusually sticky.

Scientific Results.

MAMMALS.

From the list given below it will be noticed that no big game was obtained during the expedition. The largest mammal seen was a black long-tailed monkey, probably *Semnopithecus femoralis*, observed near Gantian. However, in the mountain jungle between Kappa and Kalawat, we passed several traps which we were told were intended for Tembadaus (*Bos sondaicus*).

These traps consisted of two rows of substantial upright poles rammed into the ground and converging at one end, the other end being open and continuous with the jungle path, so that the animal once entered would jam itself between the poles at the far end of the traps. Traps for small mammals, as figured by Burbidge (4), p. 87, and Whitehead (10), p. 167, were frequently seen on Kina Balu, and most of our mammals were obtained with them. The only mammal we saw in anything like numbers was the bat *Cynopterus lucasi* which made its appearance generally late in the afternoon at our upper camp, 4,200'. The following is a complete list of the mammals obtained.

Cynopterus lucasi ♂ ♀ Kina Balu, 4,200'.

Scotophilus temminckii ♀ Kappa.

Tupaia ferruginea longipes ♂ Kina Balu, 4,000'.

Crocidura fuliginosa ♂ Kina Balu, 4,000'.

Gymnura (Hylomys) suilla ♀ Kina Balu, 2,100'.

Sciurus brookei ♂. Kina Balu, 4,000'.

———— *notatus* ♀. Gantian.

———— *prevostii* ♂. Gantian.

Mus mülleri ♀. Kina Balu, 4,000'.

———— *sabanus* ♂. Kina Balu, 2,000'.

———— *whiteheadi* ♀. Koung.

———— *ephippium* ♀. Bungol.

———— *rattus* ♂ ♀. Several specimens on the hills and in the low lands.

BIRDS.

Only three common birds were obtained in the lowland near Gantian :

Bubulcus coromandus ♀.

Nyctiornis amicta ♂ ♀.

Rhinortha chlorophæa ♀.

At Kiou, 2,400', a female *Merula obscura*, since identified by Mr. A. L. Butler, was obtained.

REPTILES.

The chief prizes obtained during the expedition belong to this group, as of the 18 species collected three proved new to

science, one of them representing a new genus, and two others new species. It is noteworthy that of only a very few species was more than one specimen obtained. The collection comprises :

CHELONIA :

Trionyx cartilagineus, Gunong Kalawat.

LACERTILIA :

Gymnodactylus marmoratus. Kina Balu, 4,200'. 8 specimens.

Hemidactylus frenatus. Near Tuaran River.

———— *platyurus*. B. N. B.

Gehyra mutilata. B. N. B.

Gecko rhacophorus, n. sp. Kina Balu, 2,100'.

Draco cornutus. Kiou.

Calotes cristatellus. B. N. B.

Japalura nigrilabris. Kina Balu, 4,200'. One ♂ ; two (♀).

Mabuia rudis. B. N. B.

———— *multifasciata*. B. N. B. 3 specimens.

Lygosoma variegatum. Kina Balu, 2,100', and 4,200'. Many specimens.

OPHIDIA.

Stoliczkaia borneensis, n. sp. Kina Balu, 4,200'.

Tropidonotus conspicillatus. Near Tampassuk River.

—— — *flavifrons*. Kina Balu, 2,100'.

———— *saravacensis*. Kina Balu, 2,100'.

Oreocalamus hanitschi, n. g. and n. sp. Kina Balu, 4,200'.

Lachesis gramineus. Kina Balu, 2,100'.

The description of the three new species as given by Mr. G. A. Boulenger, F.R.S., (3) pp. 451-453 is as follows :

Gecko rhacophorus.

“ Head moderately large, once and one-third as long as broad ; snout longer than the distance between the eye and the ear-opening, once and a half the diameter of the orbit ; ear-opening round, its diameter one-third that of the eye. Body and limbs much depressed, bordered with dermal expansions ; fingers

and toes fully half-webbed. Head, body, and limbs covered with minute granules intermixed with small, round, smooth tubercles; rostral a little more than twice as broad as deep, without median cleft; nostril pierced between several small scales; nine upper and ten lower labials; symphysial small, pentagonal; a series of six small chin-shields; spine-like tubercles on the sides of the head, the largest above the ear. A moderately developed scalloped membrane on each side of the body, scaled like the body and fringed on the edge. Abdominal scales flat juxtaposed granules. An angular series of præanal pores. Tail depressed, scaled like the body, bordered with a series of rounded lobes. Greyish above, speckled with darker and with wavy dark transverse lines; brownish beneath throat with darker dots."

Millin.

Total length	...	...	...	105
Head	...	...	...	18
Width of head	...	...	...	14
Body	...	...	...	47
Fore limb	...	...	...	21
Hind limb	...	...	...	28
Tail	...	...	...	40

"A single specimen from the Kadamaian River, Kina Balu, 2,100 feet."

"This species connects *Gecko* with *Ptychozoon* and stands in the same relation to the latter genus as *Hemidactylus platyrus* does to *Mimetozone*. The lesser development of the parachute-like lateral membrane and the absence of differentiation in the lepidosis of that membrane, justify its allocation to the genus *Gecko* rather than *Ptychozoon*."

Stoliczkaia borneensis.

"Rostral moderately large, triangular, not visible from above; a pair of very narrow internasals; a pair of large præfrontals, separated from the frontal and supraoculars by a series of small scales; frontal a little broader than long, a little shorter than the parietals; supraocular very small; eye very prominent, with vertically subelliptic pupil, surrounded by the supraocular, two or three præoculars, the fifth labial, and seven or eight small scales; nostril very large; loreal much longer than deep;

ten upper labials, the two last longest; temporals small, scale-like; a single pair of small chin-shields, in contact with three lower labials. Scales in 30 rows, those on the vertebral region and those adjacent to the ventral shields largest, elongate rhomboidal, juxtaposed, the others very small and separated by naked skin. Ventrals 210; anal entire; subcaudals 124. Rufous, with large blackish spots, at least as large as the space between them, disposed more or less regularly in three longitudinal series; brown beneath, the shields edged with yellowish."

"Total length 750 millim.; tail 240."

"A single female specimen from Mount Kina Balu, 4,200 feet."

Oreocalamus, gen. nov.

"Agrees in every respect with *Macrocalamus*, Gthr., except in the presence of a pair of internasal shields."

Oreocalamus hanitschi.

"Snout pointed. Rostral as deep as broad, the portion visible from above measuring half its distance from the frontal; internasals half as long as the prefrontals; frontal hexagonal, once and a half as long as broad, longer than its distance from the end of the snout, shorter than the parietals; nostril close to the rostral, between a nasal and the first labial (the suture between the two shields has disappeared on the left side of the type specimen); loreal longer than deep, its lower border forming an angle wedged in between the second and third labials; one præ- and one postocular; temporals 1+2; eight upper labials, fourth and fifth entering the eye, seventh largest; first lower labial in contact with its fellow behind the symphysial; four lower labials in contact with the anterior chin-shields; posterior chin-shields shorter, in contact with each other. Scales smooth, in 17 rows. Ventrals 127; anal entire; subcaudals 26 pairs. Blackish brown above and on the outer ends of the ventral shields; belly yellowish white, with a few scattered brown dots; tail brown beneath, with a darker median streak."

"Total length 375 millim.; tail 50."

"A single male specimen from Kina Balu, 4,200 feet."

AMPHIBIANS.

Of these we obtained fifteen different species, one of which proved new to science. Unlike the Reptiles, we obtained of most species of this group numerous specimens, until on Kina Balu we had to refuse the more common species which the men brought in. We also noticed on our march how the various species of Batrachians replaced each other as we went along. At Panjut, nearest the coast, we obtained only *Rana erythraea*, which was followed by *Rhacophorus leucomystax* at the Tuaran River, by *Rana kuhlii* on Gunong Kappa and Gunong Kalawat, by *Megalophrys nasuta* at Koung, Kiou and the Kadamaian River, Kina Balu, 2,100'. Finally *Bufo leptopus*, *B. penangensis* and especially *Rana whiteheadi* were dominant on Kina Balu. Of the latter species enormous numbers were brought in. The single specimen of *Ichthyophis glutinosus* was found lying near the bank of the Menternan River, after a heavy thunderstorm, with a great deal of sand sticking to its slimy surface.

Very interesting were the tadpoles of *Rana cavitympanum*, with their huge ventral suckers, which my men found attached to the boulders in the most foaming parts of the Inuman River where the current was so strong that we could keep our feet only with the greatest difficulty. T. Mocquard (7) in an appendix to Whitehead's 'Exploration of Kina Balu,' pp. 285-286, discusses these adhesive disks and considers the tadpoles to be parasitic. If, however, he had had the opportunity of seeing these creatures alive in their natural surroundings, he would have had no difficulty in discovering the true function of those suckers, which can only be to enable their owners to hold on to a firm object in the midst of the raging torrent in which their existence commences.

The Amphibians obtained are :

- Rana cavitympanum* (tadpoles). Inuman River.
- *erythraea*. Panjut.
- *kuhlii*. Gunong Kappa and G. Kalawat.
- *luctuosa*. Koung.
- *whiteheadi*. Kina Balu, 2,100' and 4,200'.
- Rhacophorus acutirostris*. Kina Balu, 4,200'.
- *leucomystax*. Tuaran River.

Ixalus natator. Kina Balu, 4,200'.

Oreobatrachus baluensis. Kina Balu, 2,100'.

Bufo leptopus. Kina Balu, 2,100' and 4,200'.

———— *penangensis*. Kina Balu, 2,100' and 4,200'.

Leptobrachium baluense, n. sp. Kina Balu, 4,200'.

———— *hasseltii*. Gunong Kappa.

Megalophrys nasuta. Koung, Kiou and Kina Balu, 2,100'.

Ichthyophis glutinosus. Menternan River, near Bungol.

Eight specimens were obtained of the new form *Leptobrachium baluense* and Mr. Boulenger, (3), pp. 453-454, gives the following description of the one specimen submitted to him :

Leptobrachium baluense.

“ Tongue pyriform, entire. Vomerine teeth in two small widely separated groups behind the line of the choanæ. Head much depressed, nearly twice as broad as long, semicircular in outline; skin adherent to the rugose skull; snout shorter than the diameter of the orbit, not projecting beyond the mouth; canthus rostralis angular; loreal region vertical, concave; inter-orbital region nearly twice as broad as the upper eyelid; tympanum feebly distinct, three-fifths the diameter of the eye. Fingers rather elongate, slender, first extending a little beyond second. Foot much longer than the head; toes moderately long, slender, with a very short web at the base; no subarticular or metatarsal tubercles. The tibio-tarsal articulation reaches the shoulder. Skin perfectly smooth; a very small tubercle near the border of the upper eyelid, above the pupil. Back and upper surface of snout dark grey; posterior half of upper surface and sides of head blackish brown; a curved light streak, the concavity turned forwards, across the upper eyelids and the interorbital region, followed by a Y-shaped blackish marking; two light spots on the upper lip, below the eye; large blackish-brown partly confluent spots on the back; sides dark brown, light-edged above; limbs dark brown, with rather indistinct darker cross-bars; throat brown, belly brownish white.”

“ From snout to vent 65 millim.”

“ A female specimen, full of ripe eggs, 3 millim. in diameter, from Mount Kina Balu, 4,200 feet.”

"Nearest allied to *L. Feo*, Blgr. Distinguished by the smaller head, the distinct tympanum, the longer digits, and the absence of a large horn-like tubercle on the upper eyelid."

FISHES.

Only two freshwater fishes were obtained during the expedition, both from the Kadamaian River, Kina Balu, 2,150', viz: one specimen of the remarkable *Gastromyzon borneensis* (= *Lepidoglanis monticola*) with its flat sucker-like ventral surface, enabling the animal to live in the mountain torrents, like the tadpoles of *Rana cavitympanum* mentioned above; and many specimens of a new homalopteroid fish, named by Mr. Boulenger (2) *Glaniopsis hanitschi*, n. g. and n. sp. He gives the following description of this fish:

Glaniopsis, gen. nov.

"Head and anterior part of body depressed; snout scarcely projecting beyond the mouth, which is moderately large; five pairs of barbels—two in front of the snout, two at the angle of mouth, and one between the two nasal openings; gill-openings narrow. Body covered with small scales, head naked; lateral line present. Dorsal fin short, further back than base of ventrals; anal short; pectoral and ventral fins horizontal, many-rayed, the outer rays simple."

"Well distinguished from *Homaloptera* by the presence of a nasal barbel."

Glaniopsis hanitschi.

"Depth of body $6\frac{1}{2}$ times in total length, length of head 5 to $5\frac{1}{2}$ times. Head scarcely longer than broad; snout rounded; eye in the middle of the length of the head, its diameter 5 times in length of head, $2\frac{1}{2}$ in interorbital width; barbels subequal in length, twice as long as diameter of eye. Dorsal 8, commencing a little behind base of ventrals, situated at equal distance from the end of the snout and the end of the caudal. Anal 7. Pectoral as long as head, terminating at a considerable distance from the ventral. Caudal as long as head, scarcely emarginate. Caudal peduncle as long as deep. Scales extremely small, smooth; lat. l. 120-125. Yellowish brown above, with trans-

verse dark brown spots or interrupted cross-bands; head dark olive-brown above; lower parts whitish; dorsal and caudal greyish, the latter blackish at the base; pectorals greyish olive above, white beneath; ventrals and anal white; a black spot at base of ventral."

"Total length 93 millim."

"A female contains ripe ova of large size, 2 millim. in diameter."

MOLLUSCA.

The following land and fresh-water mollusca, as identified by Mr. EDGAR SMITH, British Museum, were obtained during expedition:

Helicarion whiteheadi, Godwin-Austen. Kina Balu, 4,200'.

Macrochlamys subconsul, Edgar Smith. Gantian and Kina Balu, 2,150' and 4,200'.

Macrochlamys sp., Kina Balu, 4,200'.

Rhyssota brookei, Adams and Reeve. Kappa.

Hemiplecta densa, Adams and Reeve. Kina Balu, 2,150' and 4,200'.

Hemiplecta sp., Kiou.

Trochonanina kinabaluensis, Edgar Smith. Kina Balu, 2,150' and 4,200'.

Chloritis tomentosa, Pfeiffer. Kiou. Kina Balu, 2,150'.

Amphidromus adamsi, Reeve. Kina Balu, 2,150'.

Leptopoma sericatum, Pfeiffer. Kina Balu, 2,150' and 4,200'.

———— *undatum*, Metcalfe. Kina Balu, 4,200'.

Microparmarion sinrothi, Collinge and Godwin Austen Kina Balu, 2,050'.

Pterocyclos tenuilabiat, Metcalfe. Kina Balu, 2,150'.

Cyclotus trusanensis, Godwin Austen. Kina Balu, 4,200'.

Dyakia n. sp.? Kina Balu, 4,200'.

Lagochilus kinabaluensis, Edgar Smith. Kina Balu, 4,200'.

Pythia scarabæus, L. Gantian.

Melania episcopalis, Lea. Menternan River.

INSECTS.

All the Insects I obtained, with the exception of the Lepidoptera, were sent to Dr. Sharp who kindly identified all the known species. The collection, however, contains, especially

amongst the Orthoptera, quite a number of species which, according to Dr. Sharp, are probably new, and their identification is unavoidably left for some future occasion.

Some of the most remarkable Insects on Kina Balu, 4200', were certain forms which Dr. Sharp considers to be coleopterous larvæ, probably of *Lycides*. They were constantly brought in by my men in handfuls, and I collected them myself on the ground, on rotten pieces of wood, and on low shrubs. These larvæ resemble in many points certain larvæ which I collected on Bukit Timah, Singapore, and on Maxwell's Hill, Perak, and which, according to Dr. Sharp, belong to another species of *Lycides*. It is apparently this form from the Malay Peninsula which is figured by C. J. Gahan, NATURAL SCIENCE, Vol. VII (1898), p. 43, in an article on the carboniferous *Dipeltis*. Since, however, Gahan's figure is not accompanied by a description and since, as far as I know, the larva from the Malay Peninsula has never been described, I have thought it advisable to give the following description of it.

The animal is remarkably flat and leaf-like, only a few parts of its body exceeding 1 mm. in thickness, the greatly expanded lateral portions of the thorax being even thinner. The head is very small, 1.5 mm. across, and can be retracted within the cavity of the prothorax, and is always so in dead specimens. Eyes very small, black. Both maxillary and labial palps are cone-like structures, with four and three joints respectively, the basal joint in each being very much broader than the distal joint. Mandibles small. The antennæ are very short club-shaped bodies, about 0.68 mm. in length and 0.5 mm. in greatest thickness. There is a chitinous ring round the narrow base, distally followed by a crown-like chitinous structure, consisting of a broad ring from which four lobes arise lying close round the 'club.' In the living specimen, the antennæ often appear as if they themselves were retractile, but as at the slightest disturbance the entire head is withdrawn inside the tubular cavity of the prothorax, and the antennæ are so very minute, nothing definite could be ascertained. The prothorax is somewhat triangular, about twice as broad as long; both mesothorax and metathorax are nearly three times as broad as long, and the posterior border of the metathorax is deeply concave. Of the abdomen, nine segments are visible ex-

ternally, and its length is only about that of prothorax and mesothorax together. The width of the first segment is two-fifths that of the metathorax, that of the last segment one-fifth. The prothorax bears dorsally two tubercles, about equidistant from the middle line and the side, and slightly nearer the posterior than the anterior margin. The mesothorax bears two pairs of tubercles, an anterior and a posterior, the posterior pair being situated near the centre of each half of the segment, and the anterior pair at equal distance from the posterior pair and the anterior margin of the segment, and nearer the middle line; the metathorax also has two pairs of tubercles, placed like those of the mesothorax. The first eight abdominal segments bear three pairs of spines each, viz. one pair of lateral ones (shown in Gahan's figure), and two pairs of ventral ones; the last segment has lateral spines only.

Colour: the thoracic tubercles are black, and the tips of the ventral spines are yellowish. The rest of the body is uniformly deep chestnut brown.

Size: length of the largest Singapore specimen 41 mm.; of the largest Perak specimen 49 mm.; greatest width (metathorax): 21 mm. in both cases.

Hab: mountainous jungle of Singapore and Malay Peninsula. Rare.

The Kina Balu larva differs from this one (1) in the proportions of its dimensions, the thorax being narrower, and the abdomen longer and broader; (2) in the position of the thoracic tubercles, which are always placed in one row and close to the posterior margin of the segments; (3) in the presence of abdominal tubercles, viz., two in each of the first eight abdominal segments, also placed close to the posterior margin of the segments; (4) in the structure of the antennae, which, although of the same size and shape, and having also a narrow chitinous ring round their base, have the crown-like chitinous structure at their distal end divided, not into four, but into 12 narrow finger-like lobes; (5) its colour, being of a lighter chestnut brown, with an orange line along the sides of the thorax, the tubercles and feet also being orange. The number of thoracic tubercles and abdominal spines is, however, the same in the two species.

No luminosity was observed in either species, although I

had the one from the Malay Peninsula alive for several weeks, and was able to watch the Kina Balu one for several nights, as much of the material brought in had to be rejected and the larvæ were crawling about near our camp.

A tabular statement of the chief points of difference may be useful :

	<i>Malay Peninsula form.</i>		<i>Kina Balu form.</i>
Length :			
total	49 mm. (P)	41 mm. (S)	52 mm.
thorax	27	25	26·5
abdomen	22	16	25·5
Width :			
metathorax	20·5	21	18
abdomen	10	9	12
Tubercles :			
prothorax	two near centre		two near post. edge.
mesothorax	four do.		four do.
metathorax	four do.		four do.
abdomen	none		two in first 8 segments.
Antennæ :			
chitinous crown	four lobes		twelve lobes
Colour :			
general	dark chestnut		light chestnut.
edge of thorax	do.		orange
tubercles	black		do.
feet	dark chestnut		do.
spines	do.		do.
Occurrence :	rare		common (4200', March 1899).

NOTE : 'P' and 'S' refers to the largest specimens obtained in Perak and Singapore respectively.

On Kina Balu, 4200', I also found two specimens of another form which bore some superficial resemblance to the larvæ described above, but which I now consider to be adult females of some beetle, as they are luminous. Dr. Sharp (Cambridge Natural History, Vol. VI, p. 251) refers to a paper by Haase (Deutsche Ent. Zeitschrift, Vol. XXXII, 1888, pp. 145-167) where an extraordinary light-giving larva-like adult female beetle from South America is described (*Phengodes hieronymi*). The Kina Balu

form has, however, except for its luminosity and absence of wings, little resemblance to the S. American form, and rather recalls an *Oniscus* in its oval shape and uniform segments, although its body is more elongate. Its head is small and black. Mouth appendages normal; mandibles long, thin, curved, and crossing each other in repose. Antennæ with four joints each: length of first joint, 2 mm., of second 1 mm., of third 4 mm., of fourth 1 mm.; first and second joints and proximal half of third joint white, distal half of third joint black, fourth joint yellow and covered with setæ. Eyes small (0.5 mm. diameter), placed behind the base of the antennæ. The body is much depressed, with little difference between the segments of the thorax and abdomen. The larger of the two specimens captured is 60 mm. in length (prothorax 12, mesothorax 7, metathorax 6, abdomen 33 mm.), 18 mm. in greatest width (metathorax), 7 mm. in greatest thickness. The terga are slightly arched and entirely smooth; colour black, with a narrow white marginal border on the prothorax which is continued and widens posteriorly until, in the eighth abdominal segment, only a small black patch is left in the centre of its posterior margin. The last segment is small, 4 mm. across, and entirely black. The legs are black, with the exception of the tibiæ; the first seven and the ninth sternum, the chitinous patches around the thoracic (prothorax and mesothorax) spiracles and those around the first seven abdominal ones are also black; the rest is white, viz., the eighth sternum, except for a black cross, the membranous portions between the sterna, the tibiæ, and especially also the circular area around the eighth abdominal spiracle. In this oval white patch, measuring 3.5 by 2 mm., the luminous organ is situated, and the light given off by it is of an extraordinary brilliancy. I had one of these larvæ alive for nearly a week, and enclosed in a glass-tube, it served me as a night light during the long sleepless nights on Kina Balu.

Dr. Sharp to whom I submitted this species for identification, marked it 'Larva of *Lampyrides*, unknown,' but on account of its luminosity I venture to regard it as an adult female, similar to the S. American form mentioned above. The absence of sufficient material for dissection, however, makes a final decision impossible.

The following is a list of the Orthoptera, Coleoptera and Rhyngchota as identified by Dr. Sharp.

ORTHOPTERA.

- Discotettix belzebuth*, Kina Balu, 2,100'.
Marmessoidea n. sp. Bungol.
Clitarchus n. sp. (No. 1) Kina Balu, 2,100'.
Clitarchus n. sp. (No. 2) Kiou, 2,400'.
Hierodula birivia, var. *minor*, Koung.
Deroplatys exsiccata, Kiou.
Tenodera aridifolia, B. N. B.
Panesthia sp. (near *P. javana*), Kina Balu, 4,200'.

COLEOPTERA.

LAMELLICORNIA :

- Aceraius* sp. (near *A. borneanus*). Kina Balu, 4,200'.
 ——— sp. (near *A. grandis*). B. N. B.
 ——— n. sp.? Kina Balu, 4,200'.
Catharsius molossus, ♀. Kappa.
Chalcotheca auripes. Kina Balu, 2,100'.
 ——— *spathulifera*, ♀. Kiou, 2,400'.
 ——— sp. (called *C. pomacea* by Heyne). Kina Balu,
 2,100'.
Lachnosterna sp. Kina Balu, 4,200'.
Leucopholis sp. Kiou, 2,400'.
Milon sp. ♀. Kina Balu, 2,000'.
Odontolabis brookeanus. ♂ ♀. Kiou, 2,400'.
Trichogomphus milon (?) ♂. Bungol.
 ——— sp. B. N. B.
Westwoodia sp. (near *W. howitti*). Kiou, 2,400'.
 ——— sp. Kina Balu, 2,000'.
Xylotrupes gideon, var. ♀. Kiou, 2,400'.

CURCULIONIDÆ :

- Cyrtotrachelus* sp. Kiou, 2,400'.
Macrocheirus sp. Kiou, 2,400'.
Protocerus colossus. Koung.
Rhynchophorus sp. Kiou, 2,400'.

BRENTHIDÆ :

- Eutrachelus temmincki* ♂ ♀. Kiou, 2,400'.

LONGICORNIA :

- Apriona flavescens*. Kiou, 2,400'.
Batocera titana var. Koug.
Epepseotes luscus. Kiou, 2,400'.
Palimnia tessellata. Kiou, 2,400'.
Thysia wallichii. Kiou, 2,400'; Kina Balu, 2,000'.

PHYTOPHAGA :

- Anisodera sheppardi*. Kiou, 2,400'.
Aplosonyx sp. Kina Balu, 2,100'.

EROTYLIDÆ :

- Triplatoma macleayi* var. Kina Balu, 4,200'.

ENDOMYCHIDÆ :

- Eumorphus quadrinotatus*. Kina Balu, 2,100'.

RHYNCHOTA.

- Tacuna speciosa*. Kiou, 2,400', and Kina Balu, 4,150'.
Cryptotympana aquila. Kiou, 2,400', and Kina Balu, 2,150'.
Dundubia rugivena. B. N. B.
Cosmosearta viridans. Kina Balu, 2,100'.
Pycanum pretiosum. Kiou, 2,400'.
Tessaratomya malaya. Kiou, 2,400'.
Eusthenes robustus. Kina Balu, 2,000'.
Prionolomia heros. Kina Balu, 4,200'.
Laccotrepes ruber (?). B. N. B.
Flata (Pæcilopecta) circulata (?). Kiou.

LEPIDOPTERA.

The specimens collected during the expedition were identified by Messrs. L. DE NICEVILLE and R. SHELFORD :—

- Hestia lynceus*, Drury. Kiou.
Ideopsis daos, Boisd. ♂ Kina Balu, 2,000'.
Danaïs intensa, Moore. ♀ Kina Balu, 2,000'.
 ——— *crowleyi*, Jenner Weir. ♂ Kina Balu, 4,150'.
 ——— *aspasia*, Fabr. Kina Balu, 2,000'.
 ——— *septentrionis*, Butl. Kina Balu, 2,000'.
Mycalesis orseis, Hew. Kina Balu, 2,000'.

- *polydecta*, Cram. Kina Balu, 2,000'.
 ———— *janardana*, Moore. Kiou.
 ———— *pitana*, Staud. Kiou.
Ypthima pandocus, Moore. Kina Balu, 2,000'.
 ———— var. *corticaria*. Kiou; Kina Balu, 2,000'.
Amnosia baluana, Fruhstorfer. Kina Balu, 2,000'.
Thaumantis odana, Godt. ♂ Kiou.
Tenaris occulta, Grose Smith. Kiou.
Clerome besa, Hew. Kiou.
 ———— *kirata*, De Nicéville. Kiou.
Xanthotania busiris, Westw. Kina Balu.
Vanessa perakana, Distant. Kiou.
Symbrenthia hippoclus, Cram. ♂ Kiou; Kina Balu, 2,000'.
 ———— *hypselis*, var. *balunda*, Staud. Kina Balu, 2,000'.
Euthalia ambalika, Moore. Kiou.
Chersonesia rahria, Moore. Kiou.
Neptis leucothoe, Cram. Kiou.
Athyma kresna, Moore. Kiou.
Cethosia hypsea, Doub. and Hew. ♂ Kina Balu, 2,000'.
Cynthia deione, Erichson. Kina Balu, 2,000'.
Manto martina, Hew. Kiou.
Sinthusia amata, Dist. Kiou.
Sithon kiana, Grose Smith. Kina Balu, 2,000'.
Rapala sphinx, Fabr. Kiou.
Leptosia xiphia, Fabr. Kina Balu, 2,300'.
Delias parthenia, Staud. Kiou.
 ———— *eumolpe*, Grose Smith Kiou.
Terias hecabe, L. Kina Balu, 2,000'. Kiou.
Huphina (= *Appias*) *hespera*, Butl. Kina Balu, 2,000'.
Ornithoptera andromache, Staud. Kiou.
 ———— *brookeana*, Wallace. ♂ Kina Balu, 2,150'.
 ———— *ruficollis*, Butler. ♂ Kiou.
Papilio procles, Grose Smith. Kina Balu, 2,000'.
 ———— *stratotes*, Grose Smith. Kina Balu, 2,000'.
 ———— *sclateri hewitsonii*, Westwood. Kina Balu, 2,000'.
 ———— *memnon*, L. (m.) Kiou.
 ———— *helenus*, var. *palawanicus*, Staud. Kiou; Kina
 Balu, 2,000'.
 ———— *delesserti*, Guérin. Kiou.

Hasora mus, Elwes. Kina Balu, 4,150'.

Telicota bambusæ, Moore. Kiou.

Odontoptilum pygela, Hew. Kina Balu, 2,000'.

MYRIAPODA AND ARACHNIDA.

Some of the specimens obtained in these groups were identified by Dr. Sharp as follows :

CHILOPODA :

Scolopendra serspinosa. Kina Balu, 2,150'.

DIPLOPODA :

Spirotreptus baluensis. B. N. B.

Zephronia sp. (near *Z. everetti*). Kina Balu, 4,200'.

Stenoniodes baluensis. Kina Balu, 2,150'.

SCORPIONINA :

Chærilus lævimanus. Kina Balu, 4,150'.

PEDIPALPI :

Thelyphonus sp. (near *T. klugi*). Kina Balu, 4,150'.

PHALANGINA :

Sagrella sp. Kina Balu, 2,100'.

ARANEINA :

Gasteracantha vittula. B. N. B.

———— *fornicata*. Kiou, 2,400'.

Herennia ornatissima. Kiou, 2,400'.

FRESHWATER CRURSTACEA.

One species of prawn and three species of crabs were obtained. One crab, *Potamon consobrinum*, was common in the Kadamaian River a few yards from our camp on Kina Balu, 2,100', where it lived in the crevices of the rock just below the water. The men caught them by holding bait at the mouth of these crevices. The following list gives the species and the number of specimens collected :

Palæmon pilimanus de Man. 1 specimen.

Potamon convexum (de Man), 2 „

Potamon consobrinum de Man, 26 „

Potamon kadamaianum n. sp., 1 „

Mr. Borradaile to whom one or more specimens of each species were submitted, reports as follows :—“ Each of the three known species is already recorded from Borneo ; and the new

one is allied to a form found in the island by the Dutch Central Borneo expedition."

Suborder MACRURA

Tribe CARIDEA.

Family PALÆMONIDÆ.

Genus PALÆMON.

1. "PALÆMON (MACROBRACHIUM) PILIMANUS de Man.

Palæmon pilimanus, de Man, Notes Leyd. Mus. i. p. 181 (1879); Veth's 'Midden Sumatra,' Crust. p. 4, pl. ii. fig. 2 (1882).

Palæmon (Macrobrachium) pilimanus, Ortmann, Zool. Jahrb. x. Syst. p. 735, pl. xlvii. fig. 9 (1891); de Man, Notes Leyd. Mus. xx. p. 158 (1898).

The single specimen, which is from the Innuman River, between Kalawat and Bungol, British North Borneo, differs from Ortmann's figure in having the submedian spines of the telson considerably shorter; it is very possible, however, that the ends of these have been worn or broken off."

Suborder BRACHYURA.

Tribe CYCLOMETOPA.

Family POTAMONIDÆ.

Genus POTAMON.

2. "POTAMON (PARATHELPHUSA) CONVEXUM (de Man).

Paratelphusa convexa de Haan, de Man, Notes Leyd. Mus. i. p. 63 (1879); Max Weber's 'Reise Ned. O. Ind.' ii. p. 302 (1892).

Potamon (Paratelphusa) convexa, de Man, Notes Leyd. Mus. xxi. p. 142 (1899).

The single specimen seems, by the following characters, to belong to this species.

- i. There are two epibranchial teeth on each side.
- ii. There is a spine near the end of the merus in the walking legs.
- iii. The distance between the tip of the postorbital tooth and that of the first epibranchial tooth does not exceed the distance between the first and second epibranchial teeth.
- iv. The outer edge of the first epibranchial tooth is strongly convex.
- v. There are no spots on the carapace or limbs.

The dactyles of the walking-legs are rather shorter and stouter than is indicated in de Man's figure of the allied *P. maculata*. The fingers of the chelæ are dark in colour. *P. convexa* is already recorded from Java, Timor, and New Guinea, and doubtfully from Borneo¹. *P. maculata* (de Man) 1879 is a closely allied form from Sumatra.

1 ♀ British North Borneo."

3. "POTAMON (THELPHUSA)² CONSOBRINUM, de Man.

Potamon (Potamon) consobrinum, de Man, Notes Leyd. Mus. xxi. p. 99, pls. vi., ix., x. fig. 10 (1899).

This species is already reported from Borneo (Mt. Damoes and Upper Sibau River) by de Man. Ortmann (Zool. Jahrb. x. Syst. p. 301) gives a list of allied forms and their distribution.

2 ♂, 1 ♀; Kadamaian River, Kina Balu, 2,100 feet."

4. "POTAMON (GEOTHELPHUSA) KADAMAIANUM, n. sp.

A single female specimen of a form allied to *P. obtusipes* (Stimps.) 1858, and *P. dehaani* (Gray) 1847, seems to deserve a name of its own. Whether it were not better treated as a local race of one of the above species, or all three as local forms of *P. dehaani*, is a question to be settled when the subject of the interrelationship of the various forms in the genus comes up for discussion. In the meantime its distinctness seems quite as great as that of several of the generally accepted species. It differs from *P. obtusipes* in the greater slenderness of its legs, especially of the dactyles, which are long and narrow and end in a sharp claw.* A *Potamon* of the subgenus *Geothelphusa* with the surface of the carapace smooth and finely pitted over the greater part of its extent, finely granular on the front, more coarsely so on the forepart of the branchial region, rugose on the hinder part of the same region; the front much deflexed, ending below the outer angles of the orbits, when viewed in front bounded by an almost straight line curving away gradually towards the outer angles;

¹Miers, Ann. Mag. Nat. (5) v. p. 306 (1880).

² According to Ortmann (Zool. Jahrb. x. Syst. 300) *Thelphusa* is the correct name for the subgenus in which this species must be placed.

* The portion defined by asterisks was by Mr. Borradaile's wish substituted for the original passage in the P. Z. S.